Appendix C

Task B3:
Assessment of a Bear Creek Parkway Bypass via West Lake Sammamish Parkway

Parsons Brinckerhoff

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Introduction

The purpose of this summary paper is to investigate the feasibility of a downtown Redmond bypass alignment that utilizes Bear Creek Parkway (BCP) in combination with West Lake Sammamish Parkway (WLSP). The alignment would make a connection from BCP to WLSP via a new bridge across the Sammamish River east of Leary Way. It would also include a new connection between WLSP and Redmond Way. This specific alignment has been investigated at different times in the past, and as such, information developed for these previous studies is reviewed and summarized to provide the basic response in this paper. The focus of this review and analysis is on operational feasibility and impacts. An order of magnitude cost estimate is also presented based on previous work. Total present day and year 2020 daily traffic volumes that may use this corridor are estimated and the associated number of lanes needed to adequately accommodate these traffic levels identified in a later section of this paper.

Review of Previous Studies

This alignment has been analyzed to varying extents in previous studies. Documentation of previous analysis results is summarized below.

Redmond Town Center Final Access Plan Analysis, April 1987

As part of this study, an access plan for Redmond Town Center was developed which included a variety of new roadway connections and land uses associated with the proposed shopping center. The New Town Center Parkway (later known as Bear Creek Parkway) was originally proposed as a four to five lane arterial that connected Redmond Town Center to WLSP via a new bridge between Leary Way and the SR-520 EB off-ramp at WLSP. Access between the Town Center and the new Parkway was to be provided via a series of five stop-controlled intersections and widening of WLSP was recommended between the SR-520 EB off-ramp and Leary Way to accommodate the anticipated traffic loads to/from the Town Center.

Analysis scenarios included 1986 Existing Conditions, Future No-Build, Future Redmond Town Center Build, and Future Redmond Town Center Build with mitigation measures. The results of the analysis were provided for a 4-year build-out horizon of 1990 and indicated that congestion levels with Redmond Town Center in place, but with no major mitigation measures taken, would be significant for a number of locations in and around the downtown core. With the Town Center Parkway connected to WLSP (via the new bridge) and widening of WLSP between the SR-520 EB off-ramp and Leary Way, reductions in delay and improvements in LOS were possible. Further testing of the traffic operations indicated that extension of both WLSP and

148th Ave NE north of Redmond Way would provide additional benefits for the roadway network in terms of reduced congestion and more effective dilution of north-south traffic.

A proposed alignment and channelization plan for WLSP was recommended to accommodate the increase in traffic volumes associated with the Town Center and the expected redistribution of traffic due to the proposed Town Center Parkway. This roadway plan calls for a six to seven-lane section between Leary Way and the SR-520 EB ramps along with specific channelization features and turn lanes at key intersection locations. Right turn drop-lanes are shown for the NB right turn movements at WLSP/Leary and WLSP/Town Center Parkway.

Memo to Redmond City Council from Carol Osborne, Director of Public Works, May 12, 1992

This memo outlined three (3) bypass extensions as recommended by the Director of Public Works (representing City of Redmond transportation staff) to provide future congestion relief for the downtown core. Leading up to this memo was a comprehensive evaluation and analysis of nine (9) proposed alignments for an east-west downtown bypass that were subsequently ranked based on estimated cost, ability to reduce traffic on the downtown couplet, and implementation ease. The main discussion points identify the need for three specific bypass alignments of the nine evaluated. These preferred alignments were labeled "North", "South", and "East".

1) North Bypass – 90th St NE extension from 154th Ave NE to Redmond-Woodinville Road (SR-202) with new bridge crossing over Sammamish River east of 154th Ave NE.

2) South Bypass – East-West arterial connecting 159th Place/Redmond Way to 170th Ave NE/Redmond Way (Similar to existing Bear Creek Parkway alignment).

3) East Bypass – 83rd St or 85th St connection between 164th Ave NE to 169th Ave NE.

In terms of order of priority, the summary of recommendations lists the North Bypass as the top priority improvement project followed by the South Bypass and East Bypass. The North Bypass was selected as a top candidate due to its potential ability to siphon away downtown and Education Hill destination-related traffic, especially for areas south and west of the CBD. Also, funding for the 90th St Bridge had already been received at the time and the WLSP extension was materializing. To pursue the South Bypass, staff recommended an EIS due to the potential impacts on surrounding land uses and the anticipated development opportunities on the Town Center property. An EIS was also recommended for the East Bypass to allow a thorough investigation of a more direct connection between the downtown core (and areas just north and northwest of the CBD) and communities to the east. Of the two alignments for this Bypass, 83rd St and 85th St, staff recommended that the 83rd St alignment be considered as the preferred option due to the potential neighborhood impacts that could result from the 85th St alignment.

Strategic Design Program, July 1992

The Strategic Design Program (SDP) was developed through a collaborative effort between Redmond staff and outside consultants (Hudson & Jelaco, Birdsall et al) to address potential traffic congestion issues through long range roadway planning and design. This program

includes a number of large-scale improvements to the downtown street system revolving around a centerpiece "Ring Road"-type arterial that would eventually become Bear Creek Parkway (originally conceived to connect to 159th Place) and the 90th St extension to 154th Ave.

The technical memo reviewed summarized the results of the program and its associated land use changes with respect to Future Year 2005 Conditions. The memo also provided specific comparisons to other alternatives such as Existing Conditions, a No-Growth scenario (assumes regional growth in land use/traffic but no CBD growth) and a City Center Plan (CCP) which reflected background "trends" in land use/traffic growth as well as various street improvements in the downtown. Traffic volume forecasts for the SDP and CCP were developed using the City's travel demand model (maintained by Birdsall) and indicated 50 percent and 60 percent increases, respectively, over Existing Conditions with SDP volumes roughly 6 percent higher than CCP volumes.

Detailed traffic analysis results were provided for a variety of intersection locations and for several land use scenarios. No-Growth, SDP, and CCP analysis scenarios were compared based on LOS and v/c measures with optional downtown street improvements included as a variation of the No-Growth scenario. Highlights of the results are summarized below:

1) Delays for the No-Growth scenario without street improvements (LOS F) are significantly higher than for Existing Conditions (LOS B).

2) The No-Growth scenario with street improvements (LOS A) could actually show improvements in delay over Existing Conditions (LOS B).

3) Congestion levels for the CCP (LOS D) would likely be higher than for the SDP (LOS C) with both scenarios showing significantly higher congestion levels over Existing Conditions (LOS B) and the No-Growth scenario with street improvements (LOS A).

4) The congestion levels of the various scenarios:
   - Existing Conditions = LOS B (v/c 0.63)
   - Year 2005 CCP = LOS D (v/c 0.81)
   - Year 2005 SD = LOS C (v/c 0.74)
   - Year 2005 No-Growth (No Imp's) = LOS F (v/c 1.04)
   - Year 2005 No-Growth (w/Imp's) = LOS A (v/c 0.56)

Costs were also evaluated as part of this program with particular attention given to the Ring Road costs since they comprised the majority of the improvement total. Costs were broken down into categories such as Ring Road, Boulevards, Bicycle Boulevards, Signature Streets, Pedestrian Streets, and City Street and Alleys. City staff reviewed these costs and dissented only on the cost of the East Bypass Ring Road segment based on an alternative alignment (83rd St vs. 85th St). The estimated cost for the SDP improvements as determined by Hudson & Jelaco was approximately $62.6M while the City Staff estimated cost was roughly $56.6M. The difference in cost was due to the East Bypass alignment ($7.5M vs. $1.5M).

Redmond Town Center Traffic Impact Analysis Report, March 1995

The Redmond Town Center (RTC) impact analysis report summarizes potential operational characteristics associated with development of RTC and various alignments of Bear Creek Parkway (bordering the southern edge of the Town Center site). To evaluate future traffic conditions, the City of Redmond traffic model was used to assign PM peak hour trips for two future land-use/network scenarios – a short-term Year 1997 scenario (using a Year 2000 street network and approved 1997 land use elements) and a long-term Year 2010 scenario. Existing Conditions is defined as 1995 for this study. Retail related pass-by trips were included in the trip generation calculations and TIP roadway improvements given in Redmond's 1995-2010 Transportation Facilities Plan (TFP) were incorporated into the model's roadway network.

A total of 28 intersections were included in the traffic analysis work with comparisons made between Existing Conditions, Future 1997 No-Action Conditions, and three "Build" alternatives. The three alternatives mainly differed with respect to the specific alignments of Bear Creek Parkway. These alignments are described below:

1) Bear Creek Parkway connects the intersections of 170th Ave NE/Redmond Way (east terminus) and Leary Way/159th Place (west terminus). Access to Leary Way to/from RTC is provided via 162nd Place NE (existing Bear Creek Parkway alignment).

2) Bear Creek Parkway crosses the Sammamish River between Leary Way and SR-520 via a new bridge and connects to West Lake Sammamish Parkway (west terminus). East end of the arterial connects to intersection of 170th Ave NE/Redmond Way. RTC Access to Leary Way provided via 162nd Place NE.

3) Bear Creek Parkway follows the current roadway alignment that connects the intersections of Leary Way/162nd Ave NE and 170th Ave NE/Redmond Way. A future connection across the Sammamish River (see Alignment 2) is retained as a future option. Also, a new extension of 162nd Place NE is also optional that would push the proposed Bear Creek Parkway alignment through Leary Way/162nd Place NE to 159th Place NE.

The analysis results of the study for a short-term horizon indicated that with Redmond Town Center in place, significant increases in traffic volume and congestion would occur for many of the intersections evaluated. This applied to the three Bear Creek Parkway alignments as well as the 1997 No-Action scenario. Mitigation measures were then developed for each alternative as required by the City of Redmond for intersections that fall below a LOS D threshold guideline.

For each of the three Bear Creek Parkway alignment alternatives, the proposed West Lake Sammamish Parkway configuration was similar – a minimum three-lane cross section with addition turn lanes at intersections. Alternative 2, which assumed a new bridge across the Sammamish River to connect Bear Creek Parkway to WLSP, required an additional lane for SB left turn movements (from WLSP to Bear Creek Parkway) and NB right turn movements (from WLSP to Bear Creek Parkway). Also, both signalized and unsignalized options were designed for the Leary Way/162nd Place Bear Creek Parkway connection. Other spot-type improvements, such as widening of the Leary Way Bridge to a five-lane section or re-striping of the bridge

lanes, were included for each alternative based on specific operational deficiencies identified during the analysis and evaluation work.

Costs associated with various recommended improvements were not given.

East-West Downtown By-Pass Feasibility Study – Preliminary Analysis, October 1991

This document summarizes the results of a comprehensive study that evaluated a variety of alternatives for a potential downtown bypass intended to siphon "through" traffic to a designated roadway spine. A total of nine (9) alternative bypass configurations were carried through the analysis process ranging from a Ring Road concept to a north-south West Lake Sammamish Parkway. Brief descriptions of the alternatives are given below:

1) *SR-520 Widening* – This alternative included widening of the SR-520 corridor as a means for channeling downtown traffic to the regional highway/freeway system.

2) *Ring Road Alternative* – This concept utilized a series of arterials to push through-traffic to the outer edge of the downtown core. A new roadway, Town Center Parkway, would connect the east and north segments of the bypass (164th Ave, NE 85th St, 169th Ave NE, etc) to West Lake Sammamish Parkway.

3) *NE 80th St Extension* – By providing a strong east-west link through the downtown, this alternative emphasizes the 80th St corridor as the major through-movement spine. This alignment would connect Redmond Way to Union Hill Road via NE 80th St.

4) *Town Center Parkway* – As described previously, this alternative would connect Redmond Way at 170th Ave NE to West Lake Sammamish Parkway via a new arterial and bridge (across the Sammamish River).

5) *Reduced Couplet* – This alternative would convert Redmond Way into a five-lane two-way arterial and would de-emphasize Cleveland St as a minor-type local circulator. Redmond Way would thus become the major thoroughfare for east-west traffic movements.

6) *West Lake Sammamish Parkway Bypass* – This bypass would allow traffic movement's to/from SR-520 to avoid the downtown core by traveling along a north-south extension of WLSP. Traffic to/from areas to the north and northeast could utilize NE 90th St for access.

7) *Bypass Tunnels* – These tunnels would provide more direct connections for the Union Hill and Novelty Hill communities with respect to downtown access. Extension of NE 85th St or NE 90th St would complete these bypass tunnels with reasonable access to West Lake Sammamish Parkway and the SR-520 on/off ramps.

8) *Regional Arterials* – This concepts would implement a number of arterial improvements as outlined in the Eastside Transportation Program and King County's Bear Creek Community Plan. The objective would be to increase the range of alternative routes available to the multitude of O-D patterns. Selected improvements or new links included,

but were not limited to, the following: 160th Ave NE extension from 85th St to Redmond-Woodinville Road, NE 90th St extension across Sammamish River, NE 100th St extension to Avondale Road, widening of Redmond-Fall City Road.

9) *Barrier Couplet* – This alternative would build on the Reduced Couplet Alternative (5) by converting both Redmond Way and Cleveland St to two-way streets. However, in this scenario, Redmond Way is reduced to a local circulator arterial with modest capacity in order to discourage through traffic into the downtown core. Only those trips destined for the downtown would be willing to travel into the CBD. This concept would be further reinforced through signal timing changes to limit intersection capacity at "gateways".

A simple comparison matrix was developed to rank the various alternatives with respect to project cost, impact on through trips (percent change), and implementation ease. Of the nine alternatives evaluated, the Barrier Couplet Alternative (9) was thought to provide the greatest impact on through trips (-42%). It was also deemed the least expensive and one of the easiest concepts to implement. While the West Lake Sammamish Bypass was determined to be effective in reducing through trips (-37%), it was considered relatively expensive at $54 million and difficult to implement (9 on a scale of 10). The Ring Road concept (2) and Town Center Parkway concept (4) were both relatively inexpensive at $17 million and $4.4 million, respectively. Their impacts on through traffic were reasonable (-10% to -13% impact) with moderate ease of implementation.

Current Analysis

The current evaluation of the Bear Creek Parkway (BCP) Bypass connection to WLSP bases much of its technical foundation on the results of the recent Downtown Master Plan Study (PB, 11/03). The Year 2020 traffic forecasts developed from that study were used to determine appropriate traffic levels at the new BCP Extension/WLSP intersection as well as changes in trip distribution patterns associated with this new WLSP connection. Existing peak hour traffic count data for the intersection of WLSP/Leary Way was provided by the City of Redmond along with 24-hour tube count data for the key arterials. Based on the previous traffic forecasts, volumes in the downtown core are expected to increase by 60 to 100 percent depending the specific area of downtown. These growth factors were first applied to the count data for WLSP/Leary Way to develop a Future 2020 Baseline condition.

To develop Future BCP Bypass Volumes, the basic traffic redistributions determined in the Master Plan Study were modified slightly and then applied to the Baseline Volumes. The introduction of the new WLSP/BCP Bypass intersection required a number of assumptions regarding the distribution of traffic between WLSP and Redmond Town Center. The goal of the redistribution process was to hold sub-area traffic volumes constant but redirect a portion of the total volume to the new BCP Bypass.

The previous work associated with the Downtown Master Plan Concept (converting the couplet in conjunction with providing a BCP Extension) assumed that roughly 500 to 600 trips diverted to a new BCP Extension connecting west to Redmond Way, while an additional 400 to 500 trips redirected to SR-520. Due to the convenience of a new BCP Bypass to WLSP in this alternative,

and the added overall capacity of the street system, it was assumed that in addition to these previously redistributed trips destined for Redmond Way west of town, there would be additional diversions to the BCP Bypass by trips accessing the SR-520 ramps and other destinations that connect off of WLSP. As such, a total of 1,500 trips were diverted to the Bypass which consisted of the above mentioned redistributed trips from Redmond Way as well as new diverted trips destined for areas to the south (along WLSP).

The results of the volume redistribution indicate that a net increase in traffic volume between the SR-520 EB ramps and Leary Way would occur due to the new BCP Bypass connection and diverted trips. Traffic originally concentrated on Leary Way (as in the Baseline condition) would benefit somewhat from added opportunities to access SR-520 and WLSP and would disperse traffic away from the SR-520 ramps to some degree. However, the redistributed trips from Redmond Way would add 500 trips on WLSP for both the NB and SB directions. Based on the volumes developed, approximately 1,100 NB trips on WLSP would divert to the Bear Creek Bypass as opposed to remaining on WLSP to Leary Way. Likewise, 400 WB trips on Leary Way turning left onto WLSP may potentially divert to the Bypass, again reducing the amount of traffic traveling through the Leary Way/WLSP intersection.

The negative impacts of the Bypass lie primarily in the added traffic loads from the Redmond Way diversion to WLSP as well as the interaction between the new BCP Bypass signal and the adjacent signals to the north (Leary) and south (SR-520 EB Ramps). For example, with the increased volumes and potential signal spacing, severe queuing for the NB left turn movement at Leary Way/WLSP could develop as a result of heavy traffic accessing the SR-520 WB on-ramp from BCP Bypass/WLSP. This could lead to intersection spillback and possibly vehicle gridlock and failure of the system. The same scenario could develop for the SB left turn from WLSP to the BCP Bypass. The additional access point along WLSP at the Bypass would reduce the operational efficiency of the corridor from a vehicle progression standpoint.

Regardless of the trip distribution assumed, traffic volumes on WLSP between Leary Way and Bear Creek Bypass would be sufficiently high to warrant additional capacity for NB and SB traffic movements. This applies to both the Future Baseline scenario, where no roadway improvements are assumed as well as the BCP Bypass scenario. PM peak hour traffic volumes on WLSP south of Leary Way in the NB direction, for example, are estimated at 3,900 peak hour trips (~ 2,700 through + ~ 1200 right turn) and 2,600 in the SB direction for both scenarios. This corresponds to roughly 55,000 to 60,000 average daily trips total in both directions. Even using a generous link capacity of 1,000 vehicles per hour (assuming fairly balanced signal timing at intersections), the through movement would require a minimum of three (3) lanes to accommodate the anticipated traffic flow along WLSP. Similar calculations can be made for the SB direction and for the Leary Way/WLSP intersection. The resulting cross-section on WLSP at Leary Way would include a total of eight (8) lanes (6 through lanes, a right-turn lane and a left-turn lane). Even with this expanded roadway, it is likely that significant congestion would still occur along this stretch of roadway given the year 2020 volumes.

Indications as to the effectiveness of the potential WLSP connection to Redmond Way (via a new ramp and signal) show marginal results primarily due to the 500 additional trips diverting to

WLSP and Redmond Way via the Bear Creek Bypass for both the NB and SB directions. These would add to the 800-900 trips already projected to be accessing Redmond Way via WLSP in 2020. The new connection would simplify the WLSP to Redmond Way connection but, with the increase in volumes, would impact the operational effectiveness of the new interchange. Another issue regarding the operational effectiveness of such a connection is the specific location of the ramp signal terminus at WLSP/Redmond Way. This signal would be located within 100 to 200 feet of the adjacent signal at Redmond Way/W Lake Sammamish Rd thereby impacting the progression of east-west traffic on Redmond Way. The specific phasing structure of the two-signal system would require additional phases beyond a more isolated signal environment or at least one that incorporates more efficiently spaced signal locations. Resulting inefficiencies would occur and reductions in east-west throughput capacity would hinder the already congested Redmond Way corridor during the critical morning and evening peak traffic periods. Combined with the added trips (500 in each direction), the new WLSP-to-Redmond Way access would likely increase congestion levels along Redmond Way.

Order of magnitude costs associated with the Bear Creek Bypass and WLSP to Redmond Way connection are broadly estimated in the range of $30 to $40 Million. These costs consider a new roadway linking the existing BCP with WLSP, a new bridge across the Sammamish River, a widened WLSP between the junction with the new BCP connection and the ramps to Redmond Way, and a new one-way ramp linking NB WLSP with Redmond Way.

Conclusions

The Town Center Bypass concept that links the Redmond Town Center to WLSP has been studied previously based on past documents dating back to the mid-eighties. Also, the concept of a new connection from WLSP to Redmond Way has been evaluated in several studies. At face value, these ideas show merit in their ability to redirect traffic flow and provide greater flexibility for the local circulation system near the SR-520 ramps. However, in terms of serving as an effective bypass for east-west traffic through downtown, this concept appears to be more expensive than other BCP Extension concepts recently considered, and less effective due to the intermixing of bypass related traffic with WLSP and SR 520 oriented traffic. The stretch of WLSP between the new connection and Leary Way in particular is expected to be carrying heavy volumes and experience relatively high levels of congestion. While it is true that these conditions can be anticipated to occur regardless of the BCP connection, using this route as a bypass for downtown traffic will result in a slower bypass, and less diversion away from Redmond Way/Cleveland Street through downtown.